REMARKS

In paragraph 1 of the Office Action claims 1-22 are rejected less than 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement, stating:

> "The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.
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> Claims 1 and 10 recite: "said barrier layer is disposed only upon said central portion of said bias layer and upon said electrical leads" and claim 19 recites:
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> "removing portion of said barrier layer that are disposed at locations other than upon said electrical leads and said central portions of said bias layer."
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> However, Applicant discloses in specification, pp. 9-10: "Fig. 4 is a cross sectional view of the magnetic head 16 of the present invention as depicted in Fig. 3 with the improvements next described. As depicted in Fig. 4, following the oxidation step described hereabove, in which the central portion 128 of the bias layer is oxidized, a thin barrier layer 170 is deposited across the surface of the wafer such as by using a sputter deposition process," and "Fig. 4, shows that the barrier layer 170 as deposited on top of the electrical leads Significantly, the barrier layer 170 has been removed in the area 184 between the electrical leads 118, whereas the central barrier layer portion 178 is retained on top of the oxidized portion 128 of the bias layer 96."
>
> It shows that the barrier layer is disposed at wafer stage, it means that the barrier layer is disposed all area of the magnetic head and the space among them; i.e. the barrier layer is disposed not only on the central potion of the bias layer, the electrical lead, and the area between the leads. It includes other areas other than these three areas. Applicant only removes the barrier layer at the region between the electrical leads. Applicant has not removed "portions of said barrier area that are deposited at locations other than upon said electrical leads and upon central portions of said bias layer." And Applicant does not possess the feature of: "said barrier layer is disposed only upon said central portion of said bias layer and upon said electrical leads" It constitutes new matter.
>
> The rest claims are rejected for their dependence from claims 1, 10, and 19; respectively."

Responsive hereto, Applicant disagrees with the Examiner's position with regard to independent claim 19, and agrees with the Examiner's position regarding independent claims 1 and 10. Independent claim 19 is first discussed.

Independent claim 19 recites the significant limitations:

"Removing portions of said barrier layer that are disposed at locations other than upon said electrical leads and said central portions of said bias layer."

This limitation does not say removing portions of said barrier layer that are disposed at all locations other than upon said electrical leads and said central portions of said bias layer. Rather, it simply says "at locations". Now, with regard to Fig. 5 and the description in the Specification, page 9, line 21 - page 10, line 14, it is depicted and described that the barrier layer is removed from the magnetic head area 184 between the electrical leads, but retained on top of the oxidized portion 128 of the bias layer.

Therefore, the language and limitations of independent claim 19 are described in the written description of the Specification, wherein the barrier layer is removed at locations other than upon the electrical leads and the central portions of the bias layer. Applicant therefore submits that the rejection of claim 19 based upon 35 U.S.C. §112 should be withdrawn.

With regard to independent claims 1 and 10, Applicant has provided further amendments herein that are all satisfied by the written description that the barrier layer is not located between the electrical leads except above the central portion of the bias layer. Applicant submits that no new matter is entered thereby, and that no new search is required in relation thereto because the subject matter is already essentially contained within the previously presented limitations of claim 19.

With regard to the prior art rejections, Applicant next addresses them and it is submitted that the claims are neither taught by nor obvious from the cited prior art.

In paragraph 2 of the Office Action claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill et al (US 2004/0090718) in view of Soeya et al (US 5,668,685), stating:

"Claims 1 and 10, Gill et al shows a hard disk drive including a magnetic head including a read head element in Fig. 5, including: a pinned magnetic layer 512 (line 12); a free magnetic layer 516 having a central portion 536 thereof having a free magnetization; a magnetic bias layer 522 (line 1), including a central portion 538 thereof that is disposed across the central portion of the free magnetic layer; the central portion of the bias layer being comprised of a material having an approximately zero magnetic moment (lines 8-43); a pair of electrical leads 528 and 530 being disposed above the bias layer on opposite sides of the central portion of the bias layer; a barrier layer 540(lines 16-19) being disposed across the central portion of the bias layer; and shows in ABS

plane the barrier layer 540 is disposed only upon the central portion 538 of the bias layer the electrical leads 528 and 530.

Claim 19, as described above, Gill et al shows a method for fabricating a magnetic head, including: fabricating a free magnetic layer; fabricating a magnetic bias layer across the free magnetic layer; fabricating electrical leads 528 and 530 above portions of the bias layer; oxidizing a central portion of the bias layer; depositing an oxygen diffusion barrier layer upon the oxidized central portion of the bias layer.

Gill does not show the structure in depth direction; therefore, Gill is silent on whether the barrier layer is disposed between the electrical leads or not/or is there a step of removing the barrier layer from the area between electrical leads or not.

Soeya et al shows a magnetic head in Fig. 1A; wherein the barrier layer 70 (Column 8, line 30) is not disposed in the area between the electrical leads 60 (Fig. 1)/ or a step of removing the barrier layer from the area between electrical leads and teaches his structure is for improving recording density (Column 1, line 55-59). Since Gill does not show the structure in depth direction, one of ordinary skill in the art would have been looking for the structure in depth direction. Soeya et al shows a structure in depth and can provide higher recording density. One of ordinary skill in the art would have been motivated to use Soeya et al's structure for obtaining higher recording density.

Claims 2 and ii, Gill et al further shows that the central portion of the bias layer is comprised of an oxidized material (lines 16-19), and the barrier layer is comprised of a material Rh or Ru, which is inherently a barrier to oxygen diffusion from the central portion of the bias layer.

Claims 3 and 12, Gill et al shows a thin spacer layer 523 that is disposed upon the free magnetic layer 521, wherein the bias layer 522 is disposed upon the thin spacer layer 523 and the barrier layer 540 is deposed upon the bias layer.

Claims 4 and 13, Gill et al further shows that the barrier layer is comprised of a material that has low electrical conductivity.

Claims 5, 14, and 20; Gill et al further shows that the barrier layer 540 is comprised of Ru or Rh (lines 13-15).

Claims 6, 7, 15, 16, 21, and 22; Gill et al further shows that the barrier layer has a thickness of approximately 20 A (lines 31-33)..

Claims 8 and 17, Gill et al further shows that the thin spacer layer is comprised of a material that is a barrier to oxygen diffusion.

Claims 9 and 18, Gill et al further shows that the thin spacer layer is comprised of Ru (lines 23-24)."

Responsive hereto, Applicant urges that the claims are not taught by nor obvious from the cited prior art. Initially, Applicant agrees that Gill '718 teaches the use of a barrier layer and, as stated in the rejection:

"Gill does not show the structure in depth direction; therefore, Gill is silent on weather the barrier layer is disposed between the electrical leads or not/or is there a step of removing the barrier layer from the area between electrical leads or not."

With regard to this limitation, the new prior art Soeya '685 is cited. Applicant respectfully traverses the rejection based on this combination of references, and Applicant asserts that Soeya does not teach anything with regard to the use of a barrier layer above a bias layer nor anything with regard to the absence of a barrier layer (or any layer) in locations between the electrical leads of a magnetic head sensor structure, as is next discussed.

In the rejection, Soeya '685 is relied on as teaching:

"Soeya et al. shows a magnetic head in Fig. 1A; wherein the barrier layer 70 (Column 8, line 30) is not disposed in the area between the electrical leads 60 (Fig. 1) or a step of removing the barrier layer from the area between electrical leads and teaches his structure is for improving recording density (Column 1, line 55-59)."

However, Fig. 1A of Soeya is clearly a cutaway perspective view and it cannot be relied upon for an accurate depiction of magnetic head structures that are purposefully cut away in order to depict other structures.

Additionally, layer 70 is not a barrier layer as described in Applicant's Specification (it is the G2 insulation layer). Specifically, in Applicant's Specification and as depicted in Fig. 4 thereof, the barrier layer 178 is disposed between the bias layer 128 and the G2 insulation layer 160. It serves to prevent oxidizing oxygen within the central portion 128 of the bias layer from diffusing or migrating into the alumina G2 insulation layer 160, as described in the Specification on page 8, lines 21-23. Now, regarding Soeya '685, it teaches that the layer 70 is the G2 insulation layer; it is identified as the "upper gap film 70", and is described in places such as column 8, lines 30-35, stating:

"The upper gap film 70 and the lower gap film 20, which are arranged adjacently to the magnetic shield films 80, 10, have the functions to isolate the magneto-resistance effect elements from the upper and lower shield films 80 and 10 both electrically and magnetically, and are made of a non-magnetic insulating material such as glass or alumina."

Most significantly, Soeya 685 teaches that the upper gap film 70 is not removed from between the electrical leads; rather it is described as:

"an upper gap film 70 formed covering each of the above-mentioned films,...", column 8, lines 11-13. Emphasis added.

Applicant therefore respectfully submits that Soeya '685 teaches, in this regard, a standard upper gap layer, typically comprised of alumina, that is deposited across the entire surface of the magnetic head, prior to the deposition of the second magnetic shield. No portion of the upper gap layer 70 is removed in Soeya Applicant's invention includes such an upper gap layer 160 which is also deposited across the surface of the head. What Soeya '685 does not teach is a layer that may be advantageously shaped by removing portions of it that are disposed between the electrical leads. The rejection of specific claims is next discussed.

Claim 19 -- Independent claim 19 has not been amended herein. It includes the limitation of removing portions of the barrier layer that are deposited at locations other than upon said electrical leads and upon said central portions of said bias layer. Applicant submits that independent claim 19 is therefore allowable over the cited prior art in that the limitations thereof are not obvious from the combined teachings of the cited prior art. Specifically, Soeya '685 fails to teach anything with regard to the shaping of any layer in the height direction between the electrical leads, it specifically does not provide any motivation for one skilled in the art to remove portions of the barrier layer that is taught by Gill.

With regard to amended independent claims 1 and 10, they have been amended to include the limitations that the barrier layer is not disposed between the electrical leads except in the location across the central portion of the bias layer. As described above, Soeya does not teach this limitation in the height direction, and specifically, the upper gap insulation layer 70 of Soeya is a full film layer that is deposited across the surface of the wafer prior to the deposition of the second magnetic shield.

Applicant therefore respectfully submits that amended independent claims 1 and 10 recite subject matter that is not obvious from the cited prior art.

With regard to dependent claims 2-9, 11-18 and 20-22, Applicant urges that these claims either recite limitations that are not taught by or obvious from the cited prior art, or that they are allowable in that they depend, either directly or indirectly, from an allowable base claim.

In paragraph 3 of the Office Action claims 1- 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horng et al (US 2003/0179517) in view of Redon et al (US 6,381,107) and Soeya et al., stating:

"Claims 1 and 10, Horng et al shows a hard disk drive including a magnetic head including a read head element in Fig. 3b, including: a pinned magnetic layer 30 (a free magnetic layer 27 having a central portion 10 thereof having a free magnetization; a magnetic bias layer 25, including a central portion thereof that is disposed across the central portion of the free magnetic layer; the central portion of the bias layer being comprised of a material having an approximately zero magnetic moment (lines 10-14).

Horng et al does not show a barrier layer being disposed across the central portion of the bias layer.

Redon et al shows a magnetic head in Fig. 5 having a barrier layer 75 across the central portion of the bias layer, and made of Rh or Ru (Column 5, lines 5 1-53).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to add the barrier layer 75 into Horng et al's device. The rationale is as follows: Horng teaches a magnetic head with the core portion. It is obvious it has to be sealed for using in a apparatus. Redon et al teaches to add the gap layer 71 and 75 for protecting the core, which is common practice in the art. Redon et al further teaches that the layer 75 can be used for adjusting the distance between the shields (Column 5, lines 53-54). One of ordinary skill I the art would have been motivated to add the barrier layer into Horng et al's device for protecting and adjusting the distance between the shields.

Horng et al and Redon et al do not show the structure in depth direction; therefore, Horng et al and Redon et al are is silent on whether the barrier layer is

disposed between the electrical leads or not/or is there a step of removing the barrier layer from the area between electrical leads or not.

Soeya et al shows a magnetic head in Fig. 1A; wherein the barrier layer 70 (Column 8, line 30) is disposed in the area between electrical leads and teaches his structure is for improving recording density (Column 1, line 55-59). Since Horng et al and Redon et al do not show the structure in depth direction, one of ordinary skill in the art would have been looking for the structure in depth direction. Soeya et al shows a structure in depth and can provide higher recording density. One of ordinary skill in the art would have been motivated to use Soeya et al's structure for obtaining higher recording density.

Claim 19, the combination of Horng et al, Redon et al, and Soeya et al's device includes a method for fabricating a magnetic head, including: fabricating a free magnetic layer; fabricating a magnetic bias layer across the free magnetic layer; oxidizing a central portion of the bias layer; depositing an oxygen diffusion barrier layer upon the oxidized central portion of the bias layer and a step of removing the barrier layer from the area between electrical leads.

Claims 2 and 11, Horng et al further shows that the central portion of the bias layer is comprised of an oxidized material CoFeO (line 11-13), and the barrier layer is comprised of a material Ru or Rh, which is inherently a barrier to oxygen diffusion from the central portion of the bias layer.

Claims 3 and 12, Horng et al further shows that the magnetic head includes a thin spacer layer 28 that is disposed upon the free magnetic layer, wherein the bias layer is disposed upon the thin spacer layer; in Horng et al and Redon et al's device, the barrier layer is deposed upon the bias layer.

Claims 4 and 13, Redon et al shows that the barrier layer is comprised of a Ru or Rh, which has low electrical conductivity.

Claims 5, 14, and 20; Redon et al shows that the barrier layer is comprised of Ru or Rh.

Claims 6, 15, and 21; Redon et al further shows the barrier layer is comprised of Ru having a thickness of 50 A (Column 4, line 61-62), which is approximately 40.

Claims 7, 16, and 22; Redon et a]. shows that the thickness is adjustable (Column 5, lines 53-54). Applicant does not disclose any unexpected result for choosing 20 A over 50 A. One of ordinary skill in the art would be able to determine the thickness through experimentation, which would includes the thickness of 20 A.

Claims 8, 9, 17, and 18; Horng et al shows that the thin spacer layer 28 is comprised of a Ru (that is a barrier to oxygen diffusion."

This rejection relies on the teachings of Soeya '685 in the identical manner as the rejection set forth in paragraph 2 of the Office Action. Applicant therefore submits that independent claim 19 and amended independent claims 1 and 10 are patentable thereover, and Applicant relies on its arguments set forth hereabove in this regard.

Specifically, Applicant urges that Soeya fails to teach any layer (and specifically the upper gap layer 70) that is removed from (or not disposed at) the locations between the electrical leads except upon the central portion of the barrier layer. Applicant therefore respectfully submits that independent claim 19 and amended independent claims 1 and 10 recite patentable subject matter.

With regard to dependent claims 2-9, 11-18 and 20-22, Applicant urges that these claims either recite limitations that are not taught by or obvious from the cited prior art, or that they are allowable in that they depend, either directly or indirectly, from an allowable base claim.

Having responded to all of the paragraphs of the Office Action, and having amended the claims accordingly, Applicant respectfully submits that the Application is now in condition for allowance. Applicant therefore respectfully requests that a Notice of Allowance be forthcoming at the Examiner's earliest opportunity. Should the Examiner have any questions or comments

with regard to this amendment, a telephonic conference at the number set forth below is respectfully requested.

Respectfully submitted,

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CERTIFICATE OF MAILING (37 CFR 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited on December 14, 2005 with the U.S. Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date: December 14, 2005

Patricia Beilmann